Preemptive Multimodal Analgesia for Knee and Hip Arthroplasty: A Clinical Practice Guideline

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DNP Scholarly Project

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Pain management is vital for patients who are undergoing surgery. In a national survey done on adults who had surgery, 75% experienced moderate to severe pain during the immediate postoperative period and almost half reported high anxiety levels about pain (Gan, Habib, Miller, White, & Apfelbaum, 2013). Adequate pain control is particularly important following an arthroplasty (Parvizi, Miller, & Gandhi, 2011). Arthroplasty is a procedure that restores the function of a damaged joint by replacing it with an artificial joint (American Academy of Orthopaedic Surgeons [AAOS], 2014). In 2010, a total of 332,000 hip arthroplasties and 719,000 knee arthroplasties had been performed in the United States (Centers for Disease Control and Prevention [CDC], 2010).

Pain management is a fundamental part of knee and hip arthroplasty. Untreated postoperative pain can lead to several complications like myocardial ischemia, decreased pulmonary function, pulmonary infection, thrombo-embolism, ileus, decreased immunity, chronic pain, and anxiety (Korean Knee Society, 2012). Moreover, surgical pain can delay ambulation and participation in physical therapy, which are both crucial after knee or hip arthroplasty (Pasero & McCaffery, 2007). Lastly, there is a strong correlation between poorly controlled acute postoperative pain and increased long-term morbidity and mortality (Pasero & McCaffery, 2007). Pain management strongly impacts patient recovery.

One way of managing surgical pain is the utilization of preemptive multimodal analgesia. Preemptive analgesia refers to the "treatment that is initiated before surgery in order to prevent the establishment of central sensitization evoked by the incisional and inflammatory injuries during surgery and in the early postoperative period" (Kissin, 2005, p. 754). Additionally, multimodal approach means "administering more than two drugs with different mechanisms for

synergistic effects" (Korean Knee Society, 2012, p. 202). Together, preemptive multimodal analgesia involves provision of various pain management drugs before surgery (Lee et al., 2013). Some of the analgesics that can be utilized are acetaminophen, celecoxib, pregabalin, gabapentin, and oxycodone. Acetaminophen inhibits synthesis of prostaglandin, a chemical messenger that transmits pain signals, while celecoxib is a COX-2 inhibitor that peripherally works to prevent inflammation and pain (McKenzie, Goyal, & Hozack, 2013). Gabapentin and pregabalin are gabapentinoids that acts on the gamma-amino butyric acid (GABA) receptors to reduce excitation of pain neurons at the level of the spinal cord and brain (Moucha, Weiser, & Levin, 2016). Lastly, oxycodone is an opioid that inhibits the release of pain transmitters (McKenzie et al., 2013). Preemptive multimodal analgesia has shown to improve post-surgical pain, increase patient satisfaction, decrease opioid consumption, and reduce opioid related adverse effects (Post, Restrepo, Kahl, Van de Leur, & Hozack, 2010).

A community hospital in suburban Baltimore, Maryland identified pain as a major patient concern. In the recent Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS), this facility scored 71% for pain management, which is above the national average (Maryland Hospital Association [MHA], 2015). Also, this facility performed a total of 205 knee arthroplasties and 98 hip arthroplasties from January 2015 to June 2015 and determined pain management to be an essential component of recovery. Their goal is to maintain their HCAHPS score and continue to seek more ways on how to manage pain effectively. Currently, they do not have a guideline about preemptive multimodal analgesia. The purpose of this DNP scholarly project is to develop a clinical practice guideline (CPG) for preemptive multimodal analgesia for knee and hip arthroplasty.

It is anticipated that the clinicians from this community hospital will utilize the evidence based CPG to manage surgical pain. This project can further contribute to the faster recovery of patients by managing their pain and allowing them to participate in physical therapy sooner. Moreover, it is anticipated that this project will result in fewer adverse effects from opioids, shorter hospital stay, and decrease in healthcare costs.

Theoretical Framework

The theoretical framework for this scholarly project is the Diffusion of Innovations Theory (DOT) by Everett Rogers. The purpose of this theory is to describe how a new idea or innovation gets communicated and adopted by a specific population through the innovation-decision process (Boston University School of Public Health, 2016). This process includes five steps, which are: knowledge, persuasion, decision, implementation, and confirmation (Rogers, 2003). Under knowledge, the person learns about the new innovation and seeks more information about it. The individual will attempt to explore the principles behind the knowledge and the proper utilization of it. This is followed by the persuasion stage where the person starts to have favorable or unfavorable attitude towards the new innovation. Then, the individual makes a decision to adopt or reject the innovation. In this stage, the person may try the innovation and then come to a decision. Next is the implementation stage where an innovation is put into practice. Lastly, the confirmation stage involves the evaluation of the results of the innovation adopted by the person or population (Rogers, 2003).

The five innovation-decision processes are the critical steps that can be a guide in formulating a CPG for preemptive multimodal analgesia. Furthermore, this theory emphasizes the importance of targeting individuals who are open and receptive to change and can persuade the organization to adopt evidence-based practice (Rogers, 2003). Hence, to gain buy-in from the

facility, it is imperative to approach people who are influential in the organization and are willing to accept new interventions.

Literature Review

The importance of preemptive multimodal pain management for surgical patients is the focus of the evidence in this literature review. The majority of the research studies included are most on orthopedic cases since the CPG will involve knee and hip arthoplasty. The review will begin with a prospective, randomized controlled trial on total knee arthroplasty (TKA). Followed by well-designed controlled trials without randomization on effectiveness of multimodal pain management in total hip arthroplasty (THA), TKA, and ankle surgery. A study about the impact of multimodal technique on robotic-assisted laparoscopic prostatectomy (RALP) will also be discussed. Finally, the review will conclude with the synthesis of the evidence.

In 2015, Lee, Chung, & Choi conducted a prospective, randomized controlled study in Korea to compare the effects of a single pre-operative dose of pregabalin and celecoxib to celecoxib alone in patients that underwent TKA. Patients were randomized to either the control group that received preemptive celecoxib (n=20) or the study group that received preemptive celecoxib and pregabalin (n=21). The consumption of narcotics and pain scores at rest and during mobilization after surgery were significantly lower in the study group (P=<0.05 and P= 0.02, respectively). The strengths of this study include random assignment of patients and clear inclusion and exclusion criteria. Also, patients and personnel involved in the data collection were blinded to the interventions. The anesthetic, surgical style, and intraoperative pain management were standardized.

Another prospective study was done by Post et al., (2010) in the Rothman Institute of Orthopedics in Philadelphia to evaluate two different pain management protocols for hip

arthroplasty. Fifty patients were enrolled in the patient-controlled analgesia (PCA) and fifty patients received the TLC protocol, which consists of preemptive administration of acetaminophen, pregabalin, and celecoxib. The TLC group reported lower levels of pain (*P*=.001), better sleep (*P*=.001), less opioid consumption (*P*=.001), and better participation in physical therapy (*P*=.001), and activities of daily living (*P*=.002). Adverse effects such as nausea (*P*=.005) and itching (*P*=.001) were more frequent in the PCA group. The strengths of this study include adequate sample size, clear inclusion and exclusion criteria, and standardized and validated questionnaire to assess patients. The limitation of this study was the patients were not randomly assigned.

Two more retrospective studies were done in the United States about the effectiveness of multimodal pain management protocol on orthopedic surgeries. Lewis, Gunta, Mitchell, & Bobay (2012) compared the effects of non-multimodal pain management on patients who underwent TKA (n=45) and patients who received multimodal pain management (n=66). Patients who received multimodal pain management had significantly lower pain scores in the immediate postoperative period (*P*=.002), less postoperative nausea and vomiting (*P*=<.001), and decreased length of stay (*P*=.024). Additionally, Michaelson, Addante, & Charlson (2013) examined the effect of multimodal pain analgesia on the length of stay for patients undergoing hindfoot and ankle fusions. There were 175 patients who received the multimodal pain management (celecoxib, oxycodone, pregabalin, acetaminophen and steroids), and 45 patients who received narcotics. The length of stay was shorter in the multimodal pain management (*P*=<.001). The strengths of both studies include clear inclusion and exclusion criteria, consistent data collection process, and inter-rater reliability. The major drawback was the retrospective non-randomization of sample.

Lastly, Trabulsi, Patel, Viscual, Gomella, & Lallas (2010) conducted a retrospective study in Philadelphia that compared multimodal regimen (pregabalin, celecoxib, and acetaminophen) to the standard analgesic treatment (ketorolac, oxycodone and acetaminophen) in patients undergoing robotic-assisted laparoscopic prostatectomy (RALP). Thirty patients were enrolled in each group. The multimodal pain regimen significantly reduced opioid use (P =<.01). The strengths of this study include clear inclusion and exclusion criteria, standardized anesthetic, and standardized calculation to assess opioid analgesic doses.

All of the studies had enough sample size that allowed the analysis of their study. The demographics of the sample were not statistically different except for the study by Michelson et al. (2013) where patients who received the pain protocol were younger. Lee et al. (2010) did not include patients who had chronic pain; history of renal or liver failure or ischemic heart disease; and American Society of Anesthesiologists (ASA) physical status of grade 4 in the study. On the other hand, Post et al. (2010) excluded patients who are allergic to sulfa; sensitive to non-steroidal anti-inflammatory drug (NSAID); had history of opioid use greater than 20 mg/d morphine equivalents; liver, kidney or inflammatory bowel disease; and history of bleeding ulcers. Post et al. (2010), Lewis et al. (2012), and Michelson et al. (2013) utilized regional block as part of the anesthetic while Lee et al. (2010) used periarticular injection. The surgeries performed in each study were done by the same surgeons except for the study conducted by Trabulsi et al. (2010), More randomized controlled trials, with low risks of bias and random errors will help with the minor flaws in this literature review. Also, the different analgesic combinations should be evaluated further.

Based on the review of the research studies, one major component noted was the utilization of preemptive analgesia. The multimodal pain analgesics included in each study was

administered in the preoperative phase. Preemptive administration of analgesics plays a role in postoperative pain (Lee et al., 2015; Michelson et al., 2013; Trabulsi et al., 2010). Among the different multimodal pain management reviewed, celecoxib, acetaminophen, and pregabalin are the frequently utilized preemptive analgesia. These three medications are indicated to be effective in treating post-operative pain because of their opioid sparing effect (Michelson et al., 2013; Post et al., 2010). The dosages used in each study varied, however the outcomes were similar. Pregabalin, compared to gabapentin, is given in lower doses because of its high potency (Michelson et al., 2013). There were no documented side effects associated with the non-opioid medications in the reviewed studies. Overall, these drugs work synergistically to prevent pain and minimize the use of opioids.

Moreover, multimodal pain management resulted to positive outcomes. It resulted in lower pain scores (Lee et al., 2015; Lewis et al., 2012; Post et al., 2010). In the study conducted by Post et al. (2010), the satisfaction rate and pain control was similar between the multimodal analgesic group and the PCA group. The multimodal pain management also decreased narcotic consumption (Lee et al., 2015; Post et al., 2010; Trabulsi et al, 2010) and adverse effects associated with high dose narcotics such as pruritus and nausea (Lewis et al., 2012; Post et al., 2010). Furthermore, it shortened patient's hospital stay (Lewis et al., 2012; Michelson et al., 2013) and improved patient's ability to participate in physical therapy (Post et al., 2010).

Methods

Design, Setting, and Sample

The design for this scholarly project was development of a CPG on preemptive multimodal analgesia for knee and hip arthroplasty. The project took place in the anesthesia department of a community hospital in suburban Baltimore, Maryland. The project consisted of

two phases. Each phase involved different set of samples, which will be elaborated further in the procedure section.

Procedure

Phase I. The first phase involved the drafting of the CPG. The draft was presented to the expert panel, which consisted of the chief of orthopedic surgery and one Certified Registered Nurse Anesthetist (CRNA). The expert panel's role was to evaluate and critique the clinical practice guideline. After the identification of expert panels, they were contacted to schedule meeting dates and location.

The initial meeting with the expert panels focused on discussing the overview of the CPG development. The goal of the scholarly project, roles of an expert panel and purpose of the Appraisal of Guidelines for Research and Evaluation (AGREE) II Tool, an evaluation tool that will be used to assess the clinical practice guideline was discussed. The second meeting with the expert panel was dedicated on reviewing the clinical practice guideline using the AGREE II tool. During this session, recommendations and feedbacks regarding the clinical practice guideline based on the AGREE II tool was collected and discussed. The input from the different expert panels was used to revise the guideline. During the third meeting, the revised CPG was presented to the expert panel and chief of anesthesia. With their approval, the phase II of the development of CPG was started.

Phase II. The second phase of the development of the CPG was the presentation to the end-users, which includes the anesthesiologists and CRNAs in the anesthesia department. The date and time for the phase II was coordinated with the department. The sample size was 20 anesthesia providers. Before the presentation, a hard copy of the CPG and the practitioner feedback questionnaire (PFQ) was given to the anesthesia providers. A one-hour presentation

about preemptive multimodal analgesia on knee and hip arthroplasty and the CPG was given. The PFQ was collected at the end of the session. The verbal and written feedback from the end-users were collected and incorporated to the final CPG. After the presentation of the CPG a copy of the CPG and the powerpoint presentation was sent to the entire anesthesia department and copies of the PFQ tool was left at the anesthesia lounge.

Data Collection, Analysis, and Evaluation

Phase I. In the first phase, the AGREE II tool was used. It is an instrument that involves methodological strategies that can be utilized in the guideline development to minimize variability in quality (AGREE Next Steps Consortium, 2009). The tool consists of 23 items divided in 6 domains that assess the quality of scope and purpose, stakeholder involvement, rigour of development, clarity of presentation, applicability, and editorial independence. The content validity of the AGREE II tool was established by a convenience sample of 30 guideline developers, researchers and clinicians who reviewed and rated the content of the guideline. The authors determined that the AGREE II tool is of high quality than low quality (P=<0.05). Also the tool was rated as highly useful, easy to use, and helpful in differentiating guidelines of varying quality (Brouwers et al., 2010). The Cronbach scores that reflect the reliability of the tool, ranged from 0.64 to 0.89 and the number of appraisers required to reach inter-rater reliability of 0.7 ranged from two to five (Brouwers et al., 2010).

The items in the AGREE II tool are scored on a 7-point scale. Each item has specific criteria and considerations. A score of 1 (strongly disagree) is given if the specific criteria and considerations for the item was not addressed or was poorly reported. On the other hand, a score of 7 (strongly agree) is given if the specific criteria and considerations for the item was addressed or articulated remarkably in the guideline. A quality score is then calculated for each domain by

adding all the scores given by the appraisers and scaling the total as a percentage of the maximum possible score for that domain.

Quality Score for Domain I

Domain I. Scope and Purpose	Appraiser 1	Appraiser 2	Total
1. The overall objective(s) of the guideline is (are) specifically described.	6	6	12
2. The health question covered by the guideline is specifically described.	6	6	12
3. The population to whom the guideline is meant to apply is specifically described.	6	6	12
Total	18	18	36
Domain Score	83.3		

The scaled domain score will be:

$$\frac{\text{Obtained score- Minimum possible score}}{\text{Maximum possible score- Minimum possible score}}$$

Maximum possible score= 7 (strongly agree) x 3 (items) x 2 (appraisers)= 42
Minimum possible score= 1 (strongly disagree) x 3 (items) x 2 (appraisers)= 6

$$\frac{36-6}{42-6} \times 100 = 83.3$$

Phase II. In the second phase of procedures, the PFQ (Appendix B) was utilized. It is a tool that practicing clinicians can use to assess a drafted guideline. Five methodologist and five oncologists initially reviewed the PFQ. Then, 488 Ontario clinicians assessed the tool. The authors determined that the tool meets it's main goal, which is to focus on the guideline adopters and their belief structures. There was little variation in quality scores and that the variation is attributed primarily to differences among the clinicians rating the guideline (Brouwers, Graham, Hanna, Cameron, & Browman, 2004). In relation to reliability, the Cronbach score ranged from 0.75 to 0.85. The survey is a tool that can reflect the quality of the practice guideline,

development rigor, acceptability and applicability of recommendations, and comparativeness of the recommendation to current practice (Brouwers et al., 2004).

The PFQ consisted of 23 items that reflects scientific quality, methodological rigor, implementability and applicability, and acceptability of the guideline. All items are scored on a three point scale- agree, neither agree or disagree, and disagree. Descriptive statistics were used to describe the demographic characteristics of the respondents and the results of the PFQ.

Measures to Protect Human Rights and Plans for Submission to Institutional Review Board (IRB) Committees

To protect human rights, participation of the clinicians in the Phase I and Phase II of the scholarly project was voluntary. To maintain anonymity, no specific identifiers were collected from the participants in the Phase II. A query was submitted to University of Maryland Baltimore (UMB) IRB and the facility's IRB for a Non Human Subjects Research (NHSR) determination.

Results

Phase I

After a thorough review of literature, the initial CPG was presented to the stakeholders. The stakeholders utilized the AGREE II tool to evaluate the CPG. Based on their assessment, the score for each domain was calculated.

Table 1
Quality Score for Each AGREE II Domain

	Obtained Score	Domain Score
Domain 1. Scope and Purpose	36	83.3
Domain 2. Stakeholder Involvement	36	83.3
Domain 3. Rigour Of Development	96	83.3
Domain 4. Clarity Of Presentation	36	83.3
Domain 5. Applicability	48	83.3
Domain 6. Editorial Independence	24	83.3

The domain score for each section was 83.3%. The first domain, scope and purpose, focused with the overall objective of the guideline, the specific health question and the target population. Based on the recommendations, the target population and the overall objectives needed modification. The second domain pertained to the involvement of the stakeholders and intended users in the development of the guideline. The quality score for this domain was also 83.3%. The name, discipline, institution, geographical location, and description of the member's role were assessed in this section. The third domain, rigour of development, emphasized on the process used to gather and synthesize evidence, recommendations, and revisions. The search strategy, search terms, electronic databases, and inclusion and exclusion criteria utilized were appraised. The fourth domain, clarity of presentation, was focused on the language, structure, and format of the guideline. The appraisers agreed that the CPG provided was easy to read, understand, and follow. The applicability domain is concerned with the barriers, facilitators and implementation of the guideline. Lastly, the editorial independence pertained to the formulation of recommendations that are free from biases and competing interests. This assessed if guideline was developed without external funding or competing interest.

Overall, all the domains scored 83.3%. The tool has not set minimum scores to differentiate high quality and poor quality guidelines. However, the scores provided an opportunity to address improvements and recommendations needed in the guidelines. The overall quality of the guideline was also 83.3%. The appraisers highly recommended the use of the guideline with minor modifications.

Phase II

The CPG was presented to the anesthesia department after incorporating the recommendations given in Phase I. The PFQ was distributed to the audience and was collected at the end of the session. The responses from the PFQ were tallied and the mean was computed.

Table 2
Demographic Characteristic (n=20)

Variable	n	%
Type of Provider		
CRNA	16	80
MDA	4	20
Years of Experience		
0-5 years	8	40
6-10 years	4	20
>10 years	8	40

Table 2 presents the professional category and years of experience of the respondents. Majority of the respondents are CRNAs. The years of experience varied from less than 1 year to greater than 10 years. Forty percent of the respondents had 0-5 years of experience and another 40% had been providing anesthesia for at least 11 years.

Table 3
The CPG Quality Rating Result from the Practitioners Feedback Questionnaire (N=20)

	Agree %	Neither %	Disagree %
1. The rationale for developing a guideline is clear.	90	10	0
2. There is a need for a guideline on this topic.	80	15	5
3. The literature search is relevant and complete.	75	25	0
4. I agree with the methodology used to summarize the evidence included in this draft guideline.	80	20	0
5. The results of the evidence described in this draft guideline are interpreted according to my understanding of the evidence.	90	10	0
6. The draft recommendations in this report are clear.	90	10	0
7. I agree with the draft recommendations as stated.	80	20	0
8. The draft recommendations are suitable for the patients for whom they are intended.	90	10	0
9. The draft recommendations are too rigid to apply to individual patients.	20	25	55

10. When applied, the draft recommendations will produce more benefits for patients than harms	85	10	5
11. The draft guideline presents options that will be acceptable to patients	90	10	0
12. To apply the draft recommendations will require reorganization of services/care in my practice setting	65	20	15
13. To apply the draft guideline recommendations will be technically challenging	15	25	60
14. The draft guideline recommendations are too expensive to apply	15	25	60
15. The draft guideline recommendations are likely to be supported by a majority of my colleagues	70	30	0
16. If I follow the draft guideline recommendations, the expected effects on patient outcomes will be obvious	70	20	10
17. The draft guideline recommendations reflect a more effective approach for improving patient outcomes than is current usual practice.	70	25	5
18. When applied, the draft guideline recommendations will result in better use of resources than current usual practice.	80	15	5
19. I would feel comfortable if my patients received the care recommended in the draft guideline	85	10	5
20. This draft guideline should be approved as a practice guideline	75	20	5
21. If this draft guideline were to be approved as a practice guideline, I would use it in my own practice	85	10	5
22. If this draft guideline were to be approved as a practice guideline, I would apply the recommendations to my patients	85	10	5

Majority of the participants acknowledged the need for this guideline. Ninety percent agreed that the rationale for guideline was clear. The methodology, review of literature, and interpretation of evidence were identified to be pertinent and valid.

The recommendations that were presented in the CPG were recognized to be clear (90%), suitable (90%), and beneficial (85%) for the patients. It will maximize the hospital's current resources (80%), present options that will be acceptable to patients (90%), and improve patient

outcomes (70%). The CPG needed minor revision since only partial of respondents believed that the implementation of the recommendations would be easy (55%) and not technically and financially challenging (60%).

Most of the providers recommended the CPG to be accepted. Once approved, 85% were comfortable to incorporate and utilize it into their practice and apply it to patients.

Discussion

A clinical practice guideline is an essential component in improving patient care. It includes recommendations intended for the care of specific patient population that was gathered from systematic review of evidence (Institute of Medicine [IOM], 2011). After assessing the facility, it was identified that there is a need for a clinical practice guideline on managing surgical pain. Adequate postoperative pain management results to faster recovery and higher satisfaction in patients undergoing surgery. Among the different surgical procedures, knee and hip arthroplasties are among the most frequently performed surgery in the facility. Hence, after a thorough literature review and collaboration with the stakeholders, it was decided to develop a clinical practice guideline on preemptive multimodal analgesia for knee and hip arthroplasty.

There are thousands of CPGs available with varying levels of quality. For a CPG to be credible, it needs to be developed in collaboration with multidisciplinary clinicians affected by the guideline and externally reviewed by the future users (Shekelle, 2017). With this in mind, the Phase 1 was executed utilizing the AGREE II tool. As noted in the results, all the domains scored 83.3%. Several modifications were made on the guideline based on the review made by the appraisers. To improve the first two domains, the target population was specified to adult patients (age 18 and older) and the contraindications for each medication were added. Also, the stakeholders who were involved in the development of the CPG were mentioned and the process

utilized in the guideline development was discussed. For the third domain, the electronic databases were included and the inclusion and exclusion criteria were specified. The target users and the professionals who were involved in the CPG development were mentioned. The health benefits, side effects, and risks for the target population were added. Under the fourth domain, a table was created to reflect the summary of the guideline. This helps the user understand and have a general overview of the CPG. For the applicability domain, the barriers and facilitators were identified. The identified facilitators are buy-in from stakeholders, collaborative relationship between healthcare providers and patients, and support for evidence based practice. On the other hand, one of the major barriers was the possible delay in administering the medications.

The Phase II was done to assess the preferences and thoughts of the target users. This phase allowed the other anesthesia providers to be actively involved in the development of the CPG. Acceptance and support from the anesthesia team contributes to the implementation of the guideline and behavior change (Lugtenberg, Burgers, Han, & Westert, 2014). Since majority of the participants acknowledged the need for this guideline and are willing to utilize it, this will likely result to better adherence. However, not all of the target users believed that the implementation of the CPG would be easy. Lugtenberg et al. (2014) suggested the use of interactive educational group meetings in introducing new CPGs. This will provide an avenue for the participants to discuss the recommendations and how to apply them in practice. Some of the participants believe that the CPG will be technically and financially challenging. The prices for each medication are Acetaminophen 1000 mg PO- $0.03; Pregabalin 150 mg PO- $6.70; and Celebrex 400 mg PO- $2.33. If these three medications will be administered, the total cost will be $9.06.

Facilitators and Barriers

The Doctor of Nursing Practice (DNP) plays a key role in improving the health care system. The rigorous training and education process prepares the nurses to be leaders who are capable of promoting research-based practice, improving health policies, and facilitating change in the health care system (Falk, Garrison, Brown, Pintz, & Bocchino, 2015). The advanced leadership skills, knowledge, and competence developed through the DNP program, served as a main foundation in developing this CPG. These acquired expertise were instrumental in identifying the need at the facility, systematic gathering of high level evidences, creating a clear and feasible CPG, capturing stakeholders interests, and engaging other health care members to adopt evidence based practice.

There are other several factors that leveraged the acceptance of the CPG. These included the presence of transformational leaders and buy-in of stakeholders. The support, input, and good partnership between the different health care providers, particularly the chief of orthopedics, chief of anesthesia, CRNA representative, and the pharmacist in providing individualized care facilitated in the development of the CPG. In a study done by Luckett et al. (2013), it was reported that trusting partnerships among caregivers and health professionals resulted in better patient assessment and management. Moreover, involving members of the staff in the creation of this CPG also resulted in the target users buy-in. Recognizing everybody as an integral member of the team promotes staff to openly accept innovative and person centered practice (University of Ulster and University College Cork, 2008).

Since the stakeholders and majority of the target users already accept this CPG, the main barrier would be on the logistics of the implementation of the guideline. In order to overcome this barrier, educational meetings such as workshops, lectures and conferences; educational

material such as booklet and online tool should be distributed to the other members of the pre-operative phase of the surgery like the preoperative nurses. Also, patients should be educated about the importance of arriving at the preoperative area on time. After a policy or guideline is developed, it is crucial to offer training sessions to help the practitioner be familiar with its content and help in developing the skills needed to utilize in the guideline (Cote, Durand, Tousignant, & Poltras, 2009). Another barrier would be resistance to change of some providers. Even though there is buy in from majority of the target users, some providers were still hesitant in using the CPG in their practice. To address this problem, it is essential for the department and the practitioners to prioritize EBP and reallocate resources to achieve this reality and provide relevant and ongoing training for practitioners and administrators (Farley et al., 2009). Additionally, these CPG should be kept open to practitioner and client input. This will result in a more flexible implementation (Farley et al., 2009).

Implications

The approval of the CPG will lead to a practice change that will optimize and standardize pain management during the pre-operative phase of knee and hip arthroplasty. It will serve as a tool in guiding the anesthesia providers on the medications that they can administer to preemptively manage pain. The total cost of utilizing the medications mentioned in the CPG would be roughly $5,600 in one year, which can result to a 78% savings when compared to their current practice.

Postoperative pain is an integral factor in determining the length of stay of patients. In this era where medical economic forces are pressuring hospitals to decrease health care cost, being able to manage pain effectively will contribute to this. Bulk of Medicare reimbursement covers the first day of hospitalization with the rest of the budget dispersed throughout the

hospital stay. In a data provided by Accelero Health Partners (2014), Medicare reimbursed $6,975 for day one, $3,488 for day two, and $698 for day three during the 2014 fiscal year. Medicare's reimbursement is based on historical length of stay from their billing data two years prior to the current year. If the length of stay was shorter few years ago, the current hospital reimbursement that Medicare allocates will be based on that billing in spite of the current hospital length of stay. Hence, hospitals with shorter length of stay and lesser complications are able to maximize their reimbursement better. As for patients who require out of pocket expenses, the lower the cost, the less such patients need to pay.

Recommendations

The facility is currently incorporating this CPG into their enhanced recovery after surgery protocol order set and will most likely be implemented soon. Minor changes with the protocol will be done by the facility. The group is currently deciding if they will omit Pregabalin in the CPG. There are current available researches about the effectiveness of pregabalin but not enough data in terms of comparing it to the multimodal therapy. Further literature review should be done to investigate this aspect. After this CPG is utilized and evaluated, the facility can consider elaborating the guideline to accommodate the postoperative phase. Literature review can be done to explore the impact of continuing the multimodal analgesic therapy during the recovery period.

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Appendix A

Table A1

Evidence Rating Table

Author, year	Study objective/ intervention or exposures compared	Design	Sample	Outcomes studied (how measured)	Results	Level and Quality Rating
Lee, Chung, & Choi, 2015	To compare a single preoperative dose of pregabalin and celecoxib to celecoxib only in patients that underwent TKA.	Prospective, randomized, controlled trial	Single preoperative dose of pregabalin combined with celecoxib (Group L) (n=21) vs Control group (n=20)	Acute postoperative pain intensity, analgesic consumption, and functional recovery.	Mean cumulative fentanyl consumption during the first 48 hours was lower in Group L. The pain scores at rest were lower in Group L at 6 and 12 hours after surgery.	2 A
Lewis, Gunta, Mitchell, & Bobay, 2012	To compare outcomes of multimodal approach (acetaminophen, gabapentin, celecoxib, and oral opioid) to non-multimodal pain management protocol in patients that underwent TKA.	Retrospective study	Multimodal protocol (n=66) vs Non-multimodal pain management protocol (n=45)	Pain scores, length of stay, postoperative nausea and vomiting, and movement	Multimodal pain protocol had significantly lower pain scores in the immediate postoperative period, less postoperative nausea and vomiting day of surgery, and a decrease in length of stay but increased level of assistance with ambulation.	3 B
Michelson, Addante, &	To examine the effect of multimodal pain analgesia	Retrospective study	Multimodal protocol (n=175) vs traditional	Length of stay	Multimodal therapy reduces the length of stay for patients undergoing	3 B

Charlson, 2013	(acetaminophen, celecoxib, pregabalin, oral opioids, and prednisone) on the length of stay for patients undergoing hindfoot and ankle fusions.		management (n=45)		major hindfoot or ankle fusion surgery, regardless of surgical complexity.	
Post, Restrepo, Kahl, Van de Leur, & Hozack, 2010	To evaluate 2 different pain management protocols for total hip arthroplasty (THA).	Prospective study	Patient controlled analgesia (PCA) group (n=50) vs Tylenol, Lyrica, and Celebrex (TLC) group (n=50)	Pain control using visual analogue scales (VAS); Adverse effects of the medications using the hospital chart; Patient satisfaction using a questionnaire	The TLC group showed lower pain scores, decreased opioid consumption and fewer adverse effects. The satisfaction rate was high in both groups. Both protocols provided adequate pain control.	3 B
Trabulsi, Patel, Viscual, Gomella, & Lallas, 2010	To compare multimodal regimen (acetaminophen, pregabalin, celecoxib) to the standard analgesic treatment (ketorolac, oxycodone and acetaminophen) in patients undergoing robotic assisted laparoscopic radical prostatectomy (RALP).	Present, retrospective study	Multimodal group (n=30) vs standard postoperative analgesic treatment (n=30)	Intraoperative and post-operative opioid requirement	The multimodal pain regimen significantly reduced the intraoperative, postoperative, and total opioid analgesic doses administered for RALP	3 B

Table A2

Evidence Review Appraisal for Quality

Author, year	Study objective	Strengths	Weaknesses	Quality Rating
Lee, Chung, & Choi, 2015	To compare a single preoperative dose of pregabalin and celecoxib to celecoxib only in patients that underwent TKA.	Randomized controlled trial. Adequate sample size. Clear inclusion and exclusion criteria. Standardized protocols for administering the program. Patients received a standardized anesthetic. Alpha error P of <0.05 was used; thorough discussion of statistical analysis was included. Subjects were analyzed in the group to which they were assigned. Subjects in each of the groups are similar on demographics, BMI, ASA classification, number of comorbidities, and duration of surgery. Clearly presented results in text and table. Literature review is fairly comprehensive.	Although it was sufficient to assess intergroup differences in pain intensity and PCA fentanyl consumption, it was inadequate in determining medication related side effects.	A
Lewis, Gunta, Mitchell, & Bobay, 2012	To compare outcomes of multimodal approach to non-multimodal pain management protocol in patients that underwent TKA.	Adequate sample size. Clear inclusion and exclusion criteria. Consistent data collection process that was based on literature review and expert knowledge. Inter-rater reliability was done. Clearly presented results in text and table. Literature review is fairly comprehensive.	Non-randomized, retrospective study. The logistics relied on thoroughness of documentation.	B
Michelson, Addante, & Charlson, 2013	To examine the effect of multimodal pain analgesia on the length of stay for patients undergoing	Clear inclusion and exclusion criteria. Adequate sample size, however 175 received pain protocol and 45 did not. Standardized order sets were used. Subjects were analyzed in the group to which they were assigned. Subjects in each of the groups are	Non-randomized study. The study was about patients undergoing hindfoot and ankle fusions.	B

	hindfoot and ankle fusions.	similar on demographics, BMI, ASA classification, number of comorbidities, and duration of surgery. Clearly presented results in text and table. Literature review is fairly comprehensive.		
Post, Restrepo, Kahl, Van de Leur, & Hozack, 2010	To evaluate 2 different pain management protocols for THA.	Adequate sample size. (N=100) Assessment was done in a timely manner. Clear inclusion and exclusion criteria. Subjects were analyzed in the group to which they were assigned. Subjects in each of the groups are similar on demographics, BMI and primary diagnosis of degenerative joint disease of the hip. A standardized validated questionnaire was used to assess patients. Priori power analysis was done. A sample of 45 patients in each group would be adequate to detect such difference with a CI of 95%. Clearly presented results in text and table. Literature review is fairly comprehensive. Standardized protocols for administering the program. Patients received a standardized anesthetic. Alpha error P of <0.05 was used, thorough discussion of statistical analysis was included.	Patients were assigned to their respective group based upon their operative surgeon. All patients in the PCA group had direct lateral approach, whereas the TLC group received either a lateral or a direct anterior approach, which could have induced bias.	B
Trabulsi, Patel, Viscual, Gomella, & Lallas, 2010	To compare multimodal regimen to the standard analgesic treatment in patients undergoing RALP.	Clear inclusion and exclusion criteria. Subjects were analyzed in the group to which they were assigned. Subjects in each of the groups are similar on demographics, BMI, and operative time. A standardized calculation was used to assess intraoperative, postoperative, and total opioid analgesic doses. Clearly presented results in text and table. Literature review is fairly comprehensive. Alpha error P of <0.05 was used; thorough discussion of statistical analysis was included.	Assessment did not include pain scores. The research was about patients undergoing RALP.	B

Table A3

Summary of Evidence Rating

Evidence Based Practice Question (PICO): Effectiveness of preemptive multimodal analgesia for knee and hip arthroplasty.			
Level of Evidence	Number of Studies	Summary of Findings	Overall Quality
2	1	There was decreased fentanyl consumption in patients that underwent TKA during the first 48 hours after taking single preoperative dose of pregabalin and COX-2 inhibitor. Moreover, the post-operative pain scores at rest were also lower (Lee et al., 2015).	A- Bias was minimized by random assignment of patients. Also, participants and observers were blinded from the study.
3	4	Multimodal pain management resulted in lower pain scores (Lewis et al., 2012; Post et al., 2010). It also decreased narcotic consumption (Post et al., 2010; Trabulsi et al, 2010) and adverse effects associated with high dose narcotics (Lewis et al., 2012; Post et al., 2010). Lastly, it shortened patient's length of stay in the hospital (Lewis et al., 2012; Michelson et al., 2013). One major factor noted in the five studies was the utilization of preemptive analgesia. The oral pain medications included in each multimodal pain management was administered in the preoperative period. Based on the five studies, celecoxib, acetaminophen and pregabalin are the most frequently used preemptive analgesia.	B- Even though all of the studies had clear inclusion and exclusion criteria, the participants was not randomly assigned to a group. Consistent data collection process that was based on literature review and expert knowledge. Inter-rater reliability was done. The studies had adequate sample size that is sufficient to measure the concerns being addressed. Post et al. (2010) conducted power analysis. Retrospective studies limits data availability.

Appendix B

Timeline

- Submit Proposal to committee members by April 2016.
- Present Proposal to committee members on May 2016.
- Submit project proposal to University of Maryland Baltimore and hospital Institutional Review Boards (IRBs) by May 2016.
- Implement project from September 2016 to December 2016.
    - Contact expert panels by the first week of September 2016.
    - Meet with expert panels to discuss about the scholarly project, their roles, and the AGREE II Tool by third week of September 2016.
    - Submit initial CPG to expert panel and have them evaluate with AGREE II tool by fourth week of September 2016.
    - Revise and re-present CPG by October 2016.
    - Present finalized CPG to end-users and obtain Practitioner Feedback Survey by December 2016.
- Analyze, synthesize and evaluate data by February 2017.
- Submit final scholarly project manuscript to committee for review by March 2017.
- Present final scholarly project report to Committee by March 2017

Appendix C

Guideline Title: Preemptive Multimodal Analgesia for Knee and Hip Arthroplasty: A Clinical Practice Guideline

I. Scope and Practice

a. Guideline Objective

To improve postoperative pain in patients undergoing knee and hip arthroplasties at GBMC by utilizing pre-emptive multimodal analgesia.

b. Health Question Covered by the Guideline

Effectiveness of pre-emptive multimodal analgesia in improving postoperative pain in patients undergoing knee and hip arthroplasties.

c. Target Population

Adult patients (age 18 and over), undergoing knee or hip arthroplasty.

d. Clinical Specialty

Anesthesia

II. Stakeholder Involvement

a. Individuals/ Professionals Included in the Guideline Development

The Chief of Orthopedic Surgery, a Certified Registered Nurse Anesthetist (CRNA) reviewed the clinical practice guideline using the AGREE II tool. The Chief of Anesthesia and the Director of Pharmacy was also consulted during the entire process. Then, the clinical practice guideline was modified and presented to the anesthesia providers.

b. Target Users

The target users are the anesthesiologists, CRNAs, and orthopedic surgeons at GBMC.

III. Methodology

a. Methods

Extensive literature review was performed using several electronic databases such as Cumulative Index to Nursing and Allied Health Literature, Medline, Nursing Academic Edition, Cochrane, and PubMed using the inclusion and exclusion criteria. The keywords entered included preemptive analgesia, and postoperative pain. Then literatures, which fulfilled the inclusion and exclusion criteria were analyzed and served as a basis for the clinical practice guideline.

b. Inclusion and Exclusion Criteria

Inclusion criteria included full-text articles, written in English, and published from 2006 to 2016. Literatures focusing on pediatrics were excluded.

c. Strengths and Limitations

i. Methods Used to Assess the Quality and Strength of Evidence

Johns Hopkins Nursing Evidence-Based Practice

ii. Rating Scheme for the Strength of Evidence

A total of five studies were identified to be pertinent to the topic, the effectiveness of preemptive multimodal analgesia in improving postoperative pain in patients undergoing knee and hip arthroplasties. One Level 2 randomized controlled trial, and four Level 3 cohort studies were included. The Level 2 studies had high quality of evidence and all of the Level 3 studies had good evidence. The studies had enough sample size, consistent data collection process, and inter-rater reliability. Based on the level of evidence, Level 3 and above are considered high quality findings.

d. Methods Used to Formulate the Recommendations

Two Doctoral of Nursing Practice student registered nurse anesthetists developed the guideline. The formulation of recommendations was based on extensive literature review and assessment of the strength of evidence using the Johns Hopkins Evidence-Based Practice Evaluation Tool and suggestions by the stakeholders and target users.

e. Link Between the Recommendations and Supporting Evidence

(See Recommendation Section, IV)

f. Guideline Development

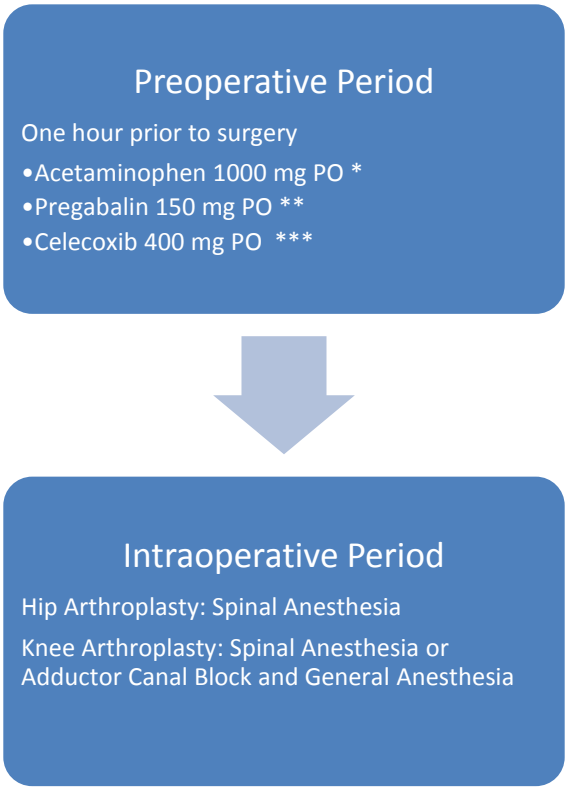
The need for this guideline was identified after a thorough assessment of the facility. Then, a systematic review of literature on preemptive multimodal analgesia was done. During the guideline development, collaboration was done with the Chief of Anesthesia and Director of Pharmacy. The initial clinical practice guideline was evaluated by the Chief of Orthopedic Surgery and a CRNA using the Appraisal of Guidelines for Research and Evaluation (AGREE) II Tool. The AGREE II Tool is an instrument that involves methodological strategies that can be utilized in the guideline development to minimize variability in quality. The tool provided an opportunity to address improvements and recommendations needed for the guidelines.

After the guideline was revised based on the AGREE II Tool, a one-hour long presentation about the guideline was given to the anesthesia department. The attendees were requested to fill up the PFQ. The PFQ is a tool that practicing clinicians can use to assess a drafted guideline. It is composed of 23 items that reflects scientific quality, methodological rigor, and applicability, and acceptability of the guideline. All items are scored on a five point scale- strongly agree, agree, neither agree or disagree, disagree and strongly disagree. After the CPG, a copy of the presentation was e-mailed to the entire anesthesia department.

The CPG was revised based on the feedback provided by anesthesia staff. Then, the finalized CPG was presented to the Chief of Anesthesia and Chief of Orthopedic Surgery.

IV. Recommendation

a. Pre-operative Period



*Do **NOT** give Acetaminophen to patients with active liver disease or increased liver enzymes.

Do **NOT give Pregabalin to patients on hemodialysis and age 80 or older. Decrease dose for patients with reduced renal functioning and BMI of <25 kg/m2.

***Do **NOT** give Celecoxib to patients with allergic-type reactions to sulfonamides.

Based on the review of the research studies, one major component noted was the utilization of preemptive analgesia. The multimodal pain analgesics included in each study was administered in the preoperative phase. Preemptive administration of analgesics plays a role in postoperative pain (Lee et al., 2015; Michelson et al., 2013; Trabulsi et al., 2010).

Among the different multimodal pain management reviewed, celecoxib, acetaminophen, and pregabalin are the frequently utilized medications to facilitate preemptive analgesia. These three medications are indicated to be effective in treating post-operative pain because of their opioid sparing effect (Michelson et al., 2013; Post et al., 2010).

V. Health Benefits, Side Effects, and Risks

a. Potential Benefits

Benefits include effective management of postoperative pain (Lee et al., 2015; Michelson et al., 2013; Trabulsi et al., 2010), lower pain scores (Lee et al., 2015; Lewis et al., 2012; Post et al., 2010), decreased intraoperative and

postoperative narcotic consumption (Lee et al., 2015; Post et al., 2010; Trabulsi et al, 2010), and lower incidence of adverse effects associated with high dose narcotics such as pruritus and nausea (Lewis et al., 2012; Post et al., 2010) Lee et al., 2015; Michelson et al., 2013; Trabulsi et al., 2010. Furthermore, it will shorten patient's hospital stay (Lewis et al., 2012; Michelson et al., 2013) and improve patient's ability to participate in physical therapy (Post et al., 2010).

b. Side effects:

Medication	Mechanism of actions (MOA)	Side effects and contraindications
Acetaminophen	The exact MOA is still unclear but it is believed to work on the central nervous system by blocking pain receptors in the brain (Gandhi & Viscusi, 2009).	Contraindicated with elevated liver enzymes, active liver disease, and hypersensitivity to acetaminophen (Gandhi & Viscusi, 2009).
Pregabalin	Binds to presynaptic voltage-gated channels α2δ-1 subunit in the CNS. Inhibits excitatory neurotransmitters and Ca2+ influx in the spinal and supraspinal pathways (Gandhi & Viscusi, 2009).	Contraindicated in patients aged 80 or older. Decrease the dose by have for patients with BMI below 25.0 kg/m2. Adverse reactions: double or blurred vision, asthenia, dizziness, or disorientation. Caution should be taken in patient with decreased renal function since is eliminated via the kidneys unchanged (about 90%) (Gandhi & Viscusi, 2009).
Celecoxib	It inhibits the conversion of arachidonic acid to prostaglandins. Do not affect platelet functions as other NSAIDs (Gandhi & Viscusi, 2009).	Contraindicated in patients with hypersensitivity to sulfonamides, active gastrointestinal ulcer, asthma, elevated blood urea nitrogen (BUN) or creatinine levels (Gandhi & Viscusi, 2009).

VI. Applicability

a. Facilitators and Barriers to Application

The facilitators identified in the implementation of the clinical practice guideline include collaborative relationship between healthcare providers and patients; presence of transformational leaders; patient centered practice; and support for evidence based practice. The chief of anesthesia, the chief orthopedic surgeon, a CRNA, the entire anesthesia providers, and the director of pharmacy had an active role in the process of the guideline development. Having the key stakeholders buy-in earlier in the process may garner support in order to implement the guideline successfully.

One of the possible barriers could be the possibility of delay in administering the medications. In order to overcome this barrier, patients should be educated about the importance of arriving at the preoperative area on time; and educating pre operative nurses about the importance of giving the medications as early as possible. Furthermore, some practitioners may be unaware of the latest evidence based practice and other providers could resist changing the way they practice. To overcome these, having educational meetings such as workshops, lectures and conferences; educational material such as booklet and online tool will be helpful to inform the end-users of the current evidence based practice (National Institute for Health and Clinical Excellence, 2007).

b. How the Recommendations Can Be Implemented

Successful implementation will require proper information dissemination and education. Buy-in from the anesthesia and orthopedic surgeons is essential. Pre-operative nurses will be educated about the guideline. This can be done through in-service education and poster presentation to the anesthesia department, orthopedic surgeons, and preoperative nurses during grand rounds.

Continuous protocol evaluation and modification should be done every two years based on new evidence-based practice. Flyers containing the summarized guideline recommendations will be distributed to the anesthesia providers, orthopedic surgeons, and nurses.

c. Potential Resource Implications of Applying the Recommendations

The prices for each medication are Acetaminophen 1000 mg PO- $0.03; Pregabalin 150 mg PO- $6.70; and Celebrex 400 mg PO- $2.33. If these three medications will be administered, the total cost will be $9.06. The total cost of utilizing the medications mentioned in the CPG would be roughly $5,600 in one year, which can result to a 78% savings when compared to their current practice.

d. Monitoring and/or Auditing Criteria

Pain level using the visual analog scale should be assessed between emergence and postoperative day one.

VII. Identifying Information and Availability

a. Funding Body/ Competing Interests

The development of this guideline was developed without external funding. Everyone who is involved in the development of this guideline confirmed that they have no competing interests.

b. Principal Authors

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d. Date Released

Projected to be April 2017

VII. References

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Appendix D

Agree II Tool

Appraisal of Guidelines for Research & Evaluation II

DOMAIN 1. SCOPE AND PURPOSE

1. The overall objective(s) of the guideline is (are) specifically described.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

2. The health question(s) covered by the guideline is (are) specifically described

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

3. The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

DOMAIN 2. STAKEHOLDER INVOLVEMENT

4. The guideline development group includes individuals from all relevant professional groups

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

5. The views and preferences of the target population (patient, public, etc.) have been sought.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

6. The target users of the guideline are clearly identified.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

DOMAIN 3. RIGOUR OF DEVELOPMENT

7. Systematic methods were used to search for evidence.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

8. The criteria for selecting the evidence are clearly described.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

9. The strengths and limitations of the body of evidence are clearly described.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

10. The methods for formulating the recommendations are clearly described.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

11. The health benefits, side effects, and risk have been considered in formulating the recommendations.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

12. There is an explicit link between the recommendations and the supporting evidence.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

13. The guideline has been externally reviewed by experts prior to its publication.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

14. A procedure for updating the guideline is provided.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

DOMAIN 4. CLARITY OF PRESENTATION

15. The recommendations are specific and unambiguous.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

16. The different options for management of the condition or health issue are clearly presented.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

17. Key recommendations are easily identifiable.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

DOMAIN 5. APPLICABILITY

18. The guideline describes facilitators and barriers to application.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

19. The guideline provides advice and/or tools on how the recommendation can be put into practice.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

20. The potential resource implications of applying the recommendations have been considered.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

21. The guideline presents monitoring and/or auditing criteria.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

DOMAIN 6. EDITORIAL INDEPENDENCE

22. The views of the funding body have not influenced the content of the guideline.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

23. Competing interests of guideline development group members have been recorded and addressed.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

OVERALL GUIDELINE ASSESSMENT

1. Rate the overall quality of this guideline.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Comments

2. I would recommend this guideline for use.

Appendix E

Practitioner Feedback Questionnaire

Title: ☐ Anesthesiologist ☐ CRNA ☐ Others: Please Specify_____
Years of Experience: ☐ 0-5 years ☐ 6-10 years ☐ >10 years

For each item, please check off the box that most adequately reflects your opinion.

1. Are you responsible for the care of patients for whom this draft guideline report is relevant? This may include the referral, diagnosis, treatment, or follow-up of patients.	Yes ☐	No ☐	Unsure ☐		
	Strongly Disagre	Disagree	Neither agree nor disagree	Agree	Strongly agree
2. The rationale for developing a guideline is clear.	☐	☐	☐	☐	☐
3. There is a need for a guideline on this topic.	☐	☐	☐	☐	☐
4. The literature search is relevant and complete (e.g., no key evidence was missed nor any included that should not have been) in this draft guideline.	☐	☐	☐	☐	☐
5. I agree with the methodology used to summarize the evidence included in this draft guideline.	☐	☐	☐	☐	☐
6. The results of the evidence described in this draft guideline are interpreted according to my understanding of the evidence.	☐	☐	☐	☐	☐
7. The draft recommendations in this report are clear.	☐	☐	☐	☐	☐
8. I agree with the draft recommendations as stated.	☐	☐	☐	☐	☐
9. The draft recommendations are suitable for the patients for whom they are intended.	☐	☐	☐	☐	☐
10. The draft recommendations are too rigid to apply to individual patients.	☐	☐	☐	☐	☐
11. When applied, the draft recommendations will produce more benefits for patients than harms.	☐	☐	☐	☐	☐
12. The draft guideline presents options that will be acceptable to patients.	☐	☐	☐	☐	☐
13. To apply the draft recommendations will require reorganization of services/care in my practice setting.	☐	☐	☐	☐	☐
14. To apply the draft guideline recommendations will be technically challenging.	☐	☐	☐	☐	☐
15. The draft guideline recommendations are too expensive to apply.	☐	☐	☐	☐	☐
16. The draft guideline recommendations are likely to be supported by a majority of my colleagues.	☐	☐	☐	☐	☐

17. If I follow the draft guideline recommendations, the expected effects on patient outcomes will be obvious.	☐	☐	☐	☐	☐
18. The draft guideline recommendations reflect a more effective approach for improving patient outcomes than is current usual practice. (If they are the same as current practice, please tick NA). *NA* ☐	☐	☐	☐	☐	☐
19. When applied, the draft guideline recommendations will result in better use of resources than current usual practice. (If they are the same as current practice, please tick NA). *NA* ☐	☐	☐	☐	☐	☐
20. I would feel comfortable if my patients received the care recommended in the draft guideline.	☐	☐	☐	☐	☐
21. This draft guideline should be approved as a practice guideline.	☐	☐	☐	☐	☐
22. If this draft guideline were to be approved as a practice guideline, I would use it in my own practice.	☐	☐	☐	☐	☐
23. If this draft guideline were to be approved as a practice guideline, I would apply the recommendations to my patients.	☐	☐	☐	☐	☐

Suggestions:_____

_____

_____

Adapted from: Brouwers, M.C., Graham, I.D., Hanna, S.E., Cameron, D.A., & Browman, G.P. (2004). Clinicians' assessments of practice guidelines in oncology: The CAPGO survey**.** *International Journal of Technology Assessment in Health Care*, *20*(4), 421-6.

Appendix F

AGREE II Tool Appraisal Result

	Appraiser 1	Appraiser 2	Total
Domain I. Scope And Purpose			
1. The overall objective(s) of the guideline is (are) specifically described.	6	6	12
2. The health question(s) covered by the guideline is (are) specifically described.	6	6	12
3. The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.	6	6	12
Total	18	18	36
Domain Score	83.3		

Domain 2. Stakeholder Involvement	Appraiser 1	Appraiser 2	Total
4. The guideline development group includes individuals from all relevant professional groups.	6	6	12
5. The views and preferences of the target population (patients, public, etc.) have been sought.	6	6	12
6. The target users of the guideline are clearly defined.	6	6	12
Total	18	18	36
Domain Score	83.3		

Domain 3. Rigour Of Development	Appraiser 1	Appraiser 2	Total
7. Systematic methods were used to search for evidence.	6	6	12
8. The criteria for selecting the evidence are clearly described.	6	6	12
9. The strengths and limitations of the body of evidence are clearly described.	6	6	12
10. The methods for formulating the recommendations are clearly described.	6	6	12
11. The health benefits, side effects, and risks have been considered in formulating the recommendations.	6	6	12
12. There is an explicit link between the recommendations and the supporting evidence.	6	6	12
13. The guideline has been externally reviewed by experts prior to its publication.	6	6	12
14. A procedure for updating the guideline is	6	6	12

provided.

Total	48	48	96
Domain Score	85.7		

Domain 4. Clarity Of Presentation	Appraiser 1	Appraiser 2	Total
15. The recommendations are specific and unambiguous.	6	6	12
16. The different options for management of the condition or health issue are clearly presented.	6	6	12
17. Key recommendations are easily identifiable.	6	6	12
Total	18	18	36
Domain Score	83.3		

Domain 5. Applicability	Appraiser 1	Appraiser 2	Total
18. The guideline describes facilitators and barriers to its application.	6	6	12
19. The guideline provides advice and/or tools on how the recommendations can be put into practice.	6	6	12
20. The potential resource implications of applying the recommendations have been considered.	6	6	12
21. The guideline presents monitoring and/or auditing criteria.	6	6	12
Total	24	24	48
Domain Score	83.3		

Domain 6. Editorial Independence			
22. The views of the funding body have not influenced the content of the guideline.	6	6	12
23. Competing interests of guideline development group members have been recorded and addressed.	6	6	12
Total	12	12	24
Domain Score	83.3		

Rate the overall quality of this guideline	6	6
I would recommend this guideline for use		
Yes		
Yes with modifications	X	X
No		